



## General

### Guideline Title

Best evidence statement (BEST). Treatment of acute hematogenous osteomyelitis.

### Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BEST). Treatment of acute hematogenous osteomyelitis. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2011 Feb 15. 5 p. [14 references]

### Guideline Status

This is the current release of the guideline.

## Recommendations

### Major Recommendations

The strength of the recommendation (strongly recommended, recommended, and no recommendation) and the quality of evidence (1a-5) are defined at the end of the "Major Recommendations" field.

1. It is recommended that transition from intravenous (IV) to oral antibiotic therapy be considered within the first seven days of treatment for hematogenous osteomyelitis to reduce complications of IV therapy (Le Saux et al., 2002 [1b]; Peltola et al., 2010 [2a]; Kolyvas et al., 1980 [2b]; Peltola, Unkila-Kallio, & Kallio, 1997 [2b]; Ruebner et al., 2006 [4a]; Zaoutis et al., 2009 [4a]).
2. It is recommended that the clinician discuss the risks and benefits of short versus prolonged IV therapy with families (Le Saux et al., 2002 [1b]; Ruebner et al., 2006 [4a]; Zaoutis et al., 2009 [4a]).

#### Definitions:

#### Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain

Quality Level	Definition
	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

#### Table of Recommendation Strength

Strength	Definition
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.

Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.

1. Grade of the Body of Evidence (see note above)
2. Safety/Harm
3. Health benefit to the patients (direct benefit)
4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)
5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis)
6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])
7. Impact on morbidity/mortality or quality of life

## Clinical Algorithm(s)

None provided

## Scope

## Disease/Condition(s)

Acute hematogenous osteomyelitis (AHO)

## Guideline Category

Treatment

## Clinical Specialty

Family Practice

Infectious Diseases

Internal Medicine

Pediatrics

## Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

## Guideline Objective(s)

To evaluate if, in otherwise healthy children with acute hematogenous osteomyelitis (AHO), early transition from intravenous (IV) antibiotic therapy to oral therapy compared to prolonged intravenous therapy (>7 days) achieves equally effective cure rates for osteomyelitis with fewer complication occurrences

## Target Population

Children 0-18 years of age with acute hematogenous osteomyelitis

## Interventions and Practices Considered

Early transition from intravenous (IV) antibiotic therapy to oral therapy compared to prolonged intravenous therapy (>7 days)

## Major Outcomes Considered

- Cure rates for osteomyelitis
- Complication rates

## Methodology

### Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

Search Strategy

1. OVID Databases: MEDLINE, Cochrane Database of Systematic Reviews

- Search Terms: osteomyelitis/dt, osteomyelitis/th  
infusions, intravenous/ae  
catheterization, central/ae  
administration, oral  
antibiotics  
ped\$, child\$
- Filters: Publication date: 1980 to December 28, 2010  
humans

English language

"all child (0 to 18 years)"

2. Additional articles identified by clinicians
3. Additional articles identified from reference lists of reviewed articles

## Number of Source Documents

Not stated

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

## Methods Used to Analyze the Evidence

Systematic Review

## Description of the Methods Used to Analyze the Evidence

Not stated

## Methods Used to Formulate the Recommendations

Expert Consensus

## Description of Methods Used to Formulate the Recommendations

Not stated

## Rating Scheme for the Strength of the Recommendations

Table of Recommendation Strength

Strength	Definition
"Strongly recommended"	There is consensus that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).
"Recommended"	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.
<p>Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.</p> <ol style="list-style-type: none"> <li>1. Grade of the Body of Evidence (see note above)</li> <li>2. Safety/Harm</li> <li>3. Health benefit to the patients (direct benefit)</li> <li>4. Burden to patient of adherence to recommendation (cost, hassle, discomfort, pain, motivation, ability to adhere, time)</li> <li>5. Cost-effectiveness to healthcare system (balance of cost/savings of resources, staff time, and supplies based on published studies or onsite analysis)</li> <li>6. Directness (the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome])</li> <li>7. Impact on morbidity/mortality or quality of life</li> </ol>	

## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

Peer Review

## Description of Method of Guideline Validation

Reviewed against quality criteria by two independent reviewers.

## Evidence Supporting the Recommendations

## References Supporting the Recommendations

Kolyvas E, Ahronheim G, Marks MI, Gledhill R, Owen H, Rosenthal L. Oral antibiotic therapy of skeletal infections in children. *Pediatrics*. 1980 May;65(5):867-71. [PubMed](#)

Le Saux N, Howard A, Barrowman NJ, Gaboury I, Sampson M, Moher D. Shorter courses of parenteral antibiotic therapy do not appear to influence response rates for children with acute hematogenous osteomyelitis: a systematic review. *BMC Infect Dis*. 2002 Aug 14;2:16. [72 references] [PubMed](#)

Peltola H, Paakkonen M, Kallio P, Kallio MJ, Osteomyelitis-Septic Arthritis Study Group. Short- versus long-term antimicrobial treatment for acute hematogenous osteomyelitis of childhood: prospective, randomized trial on 131 culture-positive cases. *Pediatr Infect Dis J*. 2010 Dec;29(12):1123-8. [PubMed](#)

Peltola H, Unkila-Kallio L, Kallio MJ. Simplified treatment of acute staphylococcal osteomyelitis of childhood. The Finnish Study Group. *Pediatrics*. 1997 Jun;99(6):846-50. [PubMed](#)

Ruebner R, Keren R, Coffin S, Chu J, Horn D, Zaoutis TE. Complications of central venous catheters used for the treatment of acute hematogenous osteomyelitis. *Pediatrics*. 2006 Apr;117(4):1210-5. [PubMed](#)

Zaoutis T, Localio AR, Leckerman K, Saddlemire S, Bertoch D, Keren R. Prolonged intravenous therapy versus early transition to oral antimicrobial therapy for acute osteomyelitis in children. *Pediatrics*. 2009 Feb;123(2):636-42. [PubMed](#)

## Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

The health benefits in terms of cure rate are equivalent in the published body of evidence. Long-term intravenous therapy may be preferred by families and children who do not take oral medicine well or are concerned about adherence. Potential benefits of oral therapy to children and their families include elimination of the discomfort of the insertion of peripherally inserted central catheter (PICC) lines, potential ease of at-home treatment, and lower costs.

### Potential Harms

#### Side Effects

Both oral and intravenous therapy can have side effects such as allergic reactions, nausea, suppressed bone marrow production, and rashes.

#### Risks

Oral therapy could fail, especially if the child is vomiting or does not consistently take the medicine. Failed oral therapy could result in failure to cure and development of chronic osteomyelitis.

## Qualifying Statements

### Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

## Implementation of the Guideline

### Description of Implementation Strategy

## Applicability Issues

Process measures may include percentage of families engaged in treatment decision-making and percentage who select short course intravenous (IV) therapy followed by oral therapy.

Outcome measures include central venous catheter (CVC) complications, readmissions, and rate of chronic osteomyelitis (i.e. failure of therapy).

The authors developed a shared decision-making aid to help the clinicians engage the families in decision-making. They modified this aid based on feedback from clinicians and families.

# Institute of Medicine (IOM) National Healthcare Quality Report Categories

## IOM Care Need

Getting Better

## IOM Domain

Effectiveness

# Identifying Information and Availability

## Bibliographic Source(s)

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## Adaptation

Not applicable: The guideline was not adapted from another source.

## Date Released

2011 Feb 15

## Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

## Source(s) of Funding

Cincinnati Children's Hospital Medical Center

## Guideline Committee

Not stated

## Composition of Group That Authored the Guideline

*Group/Team Members:* Patrick H Conway, MD, MSc, Hospital Medicine; Connie Yau, BA, Hospital Medicine; Mike Vossmeier, MD, Hospital Medicine; Eric Kirkendall, MD, Hospital Medicine; Jeff Simmons, MD, MSc, Hospital Medicine

*Support Personnel:* Betsy List, MPH, RN, James M. Anderson Center for Health Systems Excellence

## Financial Disclosures/Conflicts of Interest

Not stated

## Guideline Status

This is the current release of the guideline.

## Guideline Availability

Electronic copies: Available from the [Cincinnati Children's Hospital Medical Center](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at [EBDMInfo@cchmc.org](mailto:EBDMInfo@cchmc.org).

## Availability of Companion Documents

The following are available:

- Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [Cincinnati Children's Hospital Medical Center](#) .
- Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [Cincinnati Children's Hospital Medical Center](#) .
- Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the [Cincinnati Children's Hospital Medical Center](#) .

Process and outcome measures are listed in the [original guideline document](#) .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center Health James M. Anderson Center for Health Systems Excellence at [EBDMInfo@cchmc.org](mailto:EBDMInfo@cchmc.org).

## Patient Resources

None available

## NGC Status

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